Heat Injury Prevention Update (Option 2)

Command Surgeon

TRADOC and AAC

July 2004

General Planning Considerations

- **Full acclimatization takes up to 2 weeks**
- **Train and enforce Buddy monitoring, leader monitoring**
- **Drink frequently; ensure Soldiers eat all meals; may add salt to taste. Never use “salt tablets”**
- **Space out run formations to promote air circulation**
- **Monitor the WBGT (in the actual training area) starting at 75 F ambient temperature**
- **Plan to perform rigorous training in the cooler hours; modify training schedule, if necessary**
- **Pre-plan for medical support, iced sheets, IV starter kits and fluids, evacuation procedures/drills**
- **Uniform adjustments starting at Heat Category 3**
- **Review risk mitigating measures upon first heat casualty**
- **Promote cold/cool showers during summer months**
- **Sleep in the air conditioning if possible**

Case Study #1

- **Training Event: End-of-FTX Road March back to BN area**
- **Start time ~2200 hrs; heat category 5 at start time**
- **No uniform modifications implemented by unit; no consideration of adjusting start time to early the next morning**
- **Soldier began to fall behind platoon and was placed in front of the platoon by his DS in order to set the pace**
- **Around 2225, a Drill Sergeant noticed that Soldier appeared “delusional”**
- **Shortly after, a Soldier informed the Drill Sergeant that a soldier had fallen. DS turned back to talk to the Soldier and discovered that he had passed out (around 2230)**
- **DS took Soldier's ear temperature (read 107.1F)**
- **Soldier began to demonstrate "seizure like" activity**
- **DS removed Soldiers TA-50 while another called 911**
- **DSs experienced difficulty stabilizing Soldier because of seizure (had difficulty starting an IV); Iced Sheets not used in the field**
- **EMS arrived at 2235; Soldier transported to the hospital.**
- **At 2340, DS was notified that Soldier was deceased – DX: Heat Stroke**

Case Study #2

- **Training Event: End-of-FTX Road March back to BN area**
- **Start time ~2200 hrs; heat category 5 at start time**
- **Appropriate uniform modifications implemented by unit, but no consideration of adjusting start time to early the next morning**
- **Soldier fell to his knees during the road march and "would not remain still." "Soldier was not coherent and seemed to be in a state of delirium" as he went in and out of consciousness**
- **1SG sat Soldier down, had Soldier take off rucksack and LCE, and gave him a full canteen of water to drink**
- **1SG placed Soldier in 1 Ton Truck and turned on the A/C to help bring temperature down; cadre chose not to wait for the Ice Sheets to be moved from the lead element, but 1SG used a towel drenched in ice cold water (kept in the rear of the truck) to wrap around the Soldier**
- **Recognizing the severity of injury, 1SG called an ambulance. EMS transported Soldier to Hospital. 1SG and EMS Medics were unable to take Soldier's temperature in the field because of his agitated state**
- **Soldier diagnosed with heat stroke. Soldier suffered no brain or organ damage and is expected to make a full recovery**

Case Study #3

- **Background: New Soldier who spent 7 days at RECBN in air-conditioned buildings and in-processing (mostly in P.T. uniform)**
- **Rec Bn and new unit follows heat injury prevention / water consumption plan. Both units prohibit drinks with caffeine.**
- **Soldier was from Northern state and not acclimated to the hot weather**
- **Soldier had no physical problems or illnesses while at the RECBN, but was taking Allegra-D for allergies (antihistamine and sudafed).**
- **Training Event: RECBN shipped Soldier to first training unit mid-day during heat category V; Soldier moved personal bags and performed 20 push-ups and 15 side-straddle hops.**
- **Unit moved Soldiers into air-conditioned rooms to reduce exposure to heat**
- **Drill Sergeant identified the Soldier was “ill” due to inappropriate/incoherent behavior; DS took Soldier to the emergency room.**
- **No “on the scene” treatment for Heat Injury was administered by the unit**
- **Soldier was diagnosed with Heat Stroke by hospital personnel**

Lessons Learned

- **Heat stress is cumulative – Soldiers had been exposed to Category 5 heat for ~10 hours prior to road march start time; no consideration given to shifting start time 5 or 6 hours later during better heat conditions**
- **Mental status changes should always alert leaders of Heat Injury -- more often than not, mental status changes (speaking incoherently, "delusional behavior") occurs prior to a Soldier passing out from extreme Heat Exhaustion or Heat Stroke – Call 911 if mental status changes occur**
- **Uniform modifications decrease the risk of Heat Injury during Heat Categories 3 through 5**
- **Rec Bn Soldier was not acclimated to the summer weather (Army recommends 8-14 days for acclimation). Soldier had been in RecBn for 7 days, but mostly in air-conditioned buildings and wearing P.T. uniform**

Lessons Learned (con't)

- **RecBn Soldier was taking Allegra-D (antihistamine and sudafed) – this medication increases the risk for a person to experience a Heat Injury**

- **The fill time for the unit was at midday - Soldiers were in BDUs and in the heat for hours moving bags, standing/sitting in lines, and conducting PT prior to shipping from RecBn.**

- **No consideration of moving fill times to the early morning hours during the summer months**

- **DS realized new Soldier's inappropriate behavior could be a sign of significant Heat Injury; the Drill Sergeant drove the Soldier to the hospital for treatment. The better procedure would have been to call 911 and**

When to Call “911” for Evacuation

- **Soldier vomits more than once**
- **No improvement in symptoms after 1 hour**
- **General deterioration in condition**
- **Loss of consciousness/delerium/ acting inappropriately (mental status changes)**

Iced Sheets Save Lives

Command Surgeon 13 May 2004 Info Paper provides information on the purpose and procedures for use of iced sheets in the treatment of heat stroke.

Heat Injury Prevention is Leader Business

- **Summer Risk Assessments should include:**
  - **Heat Injury Prevention planning, risk mitigation**
  - **Ensuring all leaders know how to quickly recognize and treat Heat Injury**
  - **Consideration of Soldier acclimatization**
  - **Local training area measurements of WBGT**
  - **Time of day training is to be conducted: consider training modification based on expected/actual Heat Category**
  - **Hydration discipline for all Soldiers**
  - **Hydration monitoring by leaders**
  - **Reassessment of risk mitigating measures if heat injuries occur – beware if all of a Heat Stroke Soldier's buddies have been exposed to the same heat stress (increases risk)**

Backup slides

IET Heat Injury Prevention

- AAC Commander signed memo 27 Apr 2004; memo reminded Commanders to:
  - Monitoring WBGT at training sites (not centrally)
  - Enforce standard measures for modifying physical activity and uniform in order to mitigate risk
  - Follow work/rest/hydration strategy to mitigate risk
  - Establish drinking schedules based on training event and expected heat category
  - Establish procedures for monitoring Soldier hydration (for instance, the tying knots in a cord for each canteen consumed)
  - Not allow more than 1 qt of Water per hour or 12 quarts per day (to prevent hyponatremia or “low sodium” due to excessive water intake)
  - Complete Heat Injury Prevention leader training (Bde Cdr down to every DS) NLT 15 May 2004

Common Susceptibility Factors

- **Previous hot weather injury**
- **Inadequate acclimatization**
- **Inadequate nutrition**
- **Inadequate hydration**
- **Prolonged exposure to heat (one day)**
- **Cumulative exposure to heat (several days)**
- **Poor physical stamina (2mi run > 16 mins)**
- **Medications (antihistamines, sudafed products)**
- **Large body mass**
- **Minor illness**
- **Nutritional Supplements – ephedra**
- **Age >40**
- **Alcohol intake**

Work/Rest/Water Consumption Table

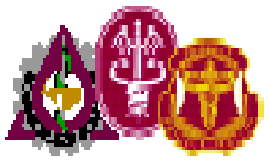
Applies to average sized, heat acclimated soldier wearing BDU, hot weather

Easy Work	Moderate Work	Hard Work
• Weapon Maintenance • Walking Hard Surface at 2.5 mph, < 30 lb Load • Marksmanship Training • Drill and Ceremony	• Walking Loose Sand at 2.5 mph, No Load • Walking Hard Surface at 3.5 mph, < 40 lb Load • Calisthenics • Patrolling • Individual Movement Techniques, i.e. Low Crawl, High Crawl, etc.	• Walking Hard Surface at 3.5 mph, ≥ 40 lb Load • Walking Loose Sand at 2.5 mph with Load • Field Assaults

Heat Category	WBGT Index, F°	Easy Work		Moderate Work		Hard Work	
		Work/Rest	*Water Intake (Qt/H)*	*Work/Rest*	*Water Intake (Qt/H)*	*Work/Rest*	*Water Intake (Qt/H)*
1	78° - 81.9°	NL	½	NL	¾	40/20 min	¾
2 (GREEN)	82° - 84.9°	NL	½	50/10 min	¾	30/30 min	1
3 (YELLOW)	85° - 87.9°	NL	¾	40/20 min	¾	30/30 min	1
4 (RED)	88° - 89.9°	NL	¾	30/30 min	¾	20/40 min	1
5 (BLACK)	> 90°	50/10 min	1	20/40 min	1	10/50 min	1

- The work-rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Fluid needs can vary based on individual differences (± ¼ qt/h) and exposure to full sun or full shade (± ¼ qt/h).
- **NL** = no limit to work time per hour.
- **Rest** means minimal physical activity (sitting or standing), accomplished in shade if possible.
- ***CAUTION: Hourly fluid intake should not exceed 1½ quarts.***

  Daily fluid intake should not exceed 12 quarts.
- If wearing body armor add **5°F** to WBGT in humid climates.
- If wearing NBC clothing (MOPP 4) add **10°F** to WBGT.



For additional copies contact: U.S. Army Center for Health Promotion and Preventive Medicine (800) 222-9698
Also see http://chppm-www.apea.army.mil/heat for electronic versions of this document and other heat injury prevention resources.

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Symptoms of Dehydration

- dark urine
- headache
- dizziness, nausea
- weakness
- dry mouth, tongue, throat, lips
- lack of appetite
- stomach cramps or vomiting
- irritability
- decreased amount of urine being produced
- mental sluggishness (difficulty answering easy questions)
- increased or rapid heartbeat
- lethargic
- unconsciousness

n progress to Heat Exhaustion, then Heat Stroke if no
treated appropriately

Dehydration Treatment

- **drink WATER (1 to 1 1/2 qts per hour to a maximum of 12 qts in one day)**
- **avoid caffeinated liquids such as sodas, coffee, tea**
- **Follow a leader-instituted work/rest cycle**

Heat Stroke Diagnosis

- **Heat Stroke is a MEDICAL EMERGENCY**
- **Represents a total breakdown in body temperature control**
- **Occurs when:**
  - **Persistently high body temperature caused by internal and external factors combined.**

Heat Stroke Symptoms

- **Hot and dry skin**
- **Sweating may or may not occur**
- **Severe headache**
- **Upset stomach**
- **Weakness or dizzyness**
- **“Delirium” / speaking incoherently or inappropriately (change of mental status)**
  - **Cannot tell you their name, the month, the year, etc.**
- **Loss of consciousness/ passing out**
- **Convulsions**

Heat Stroke Treatment

- **Place in the shade while someone calls “911”**
- **Remove clothing**
- **Give fluids by mouth, but not if unconscious**
- **LOWER VICTIM‘S BODY TEMPERATURE!**
  - **Sprinkle with water and institute fanning**
  - **Place ice on the back and in the armpits, neck and groin (next to the large arteries of the body)**
  - **Use iced sheets // stop if shivering occurs**
  - **Massage large muscles while cooling**
- **Evacuate once EMS arrives or after initial treatment is instituted if delay in evacuation**

Additonal Heat Stroke Treatment to be administered by Combat Lifesavers, Medics

- In addition to previous measures:
  - Keep the airway open
  - Start Ringer’s Lactate or normal saline